

REMARKS

Claims 1-8 were originally filed in this application. In this Response, none of the claims have been cancelled, each of claims 1-8 have been amended, and no new claims have been added. Accordingly, claims 1-8 are currently under consideration. Amendment and cancellation of a claim is not to be construed as a dedication to the public of any subject matter.

Rejection under 35 U.S.C. §112, second paragraph

Rejection under 35 U.S.C. §112, second paragraph, as indefinite. In support of the objection the Examiner states:

“With respect to claim 1, the applicants merely recite an aggregation of parts lacking in structural and functional interrelation, and therefore the claim is considered vague and indefinite. Furthermore, it is unclear as to the structural limitation the applicants are attempting to recite by, “reduced diameter along coaxial direction from bottom to top of the riser reactor.”

“With respect to claims 3-6, “the riser” lacks proper positive antecedent basis.

“With respect to claims 7-8, “the conjunct section” lacks proper positive antecedent basis.

“With respect to claim 5, it is unclear as to where, “the height of said first reaction zone is generally from about 30% to about 60%...” is disclosed in the specification. It appears that the term “first” is a typographical error, and that the applicants intended to recite, “the height of said second reaction zone is generally from about 30% to about 60%...” as evidenced by the specification (page 4, lines 9-12).

“With respect to claim 6, it is unclear as to where, “the height of said first reaction zone is generally from about 0% to about 20%...” is disclosed in the specification. It appears that the term “first reaction” is a typographical error, and that the applicants intended to recite, “the height of said outlet zone is generally from about 0% to about 20%...” as evidenced by the specification (page 4, lines 16-20).

“With respect to claim 8, it is unclear as to where, “the conjunct section between said first reaction zone and said outlet zone...” is disclosed in the specification. It appears that the term “first” is a typographical error, and that the applicants intended to recite, “the conjunct section between said second reaction zone and said outlet zone...” as evidenced by Figure (conduit 8 comprising angle β).”

Applicants wish to thank the Examiner for the thorough explanation of those regions of the claims in which the style might be improved, but disagree that the claims were in any manner vague. The claims have been extensively rewritten.

Claim 1 as originally written, was drafted to one of ordinary skill in the art. As such, the recitation in the claim of a riser reactor for fluid catalytic cracking duty having a pre-lift zone, a first reaction zone, a second reaction zone, and an outlet zone, would permit the worker to recognize that in a riser reactor, the reactant would flow through the reactor in a specific order-- from the pre-lift zone to the outlet zone and pass through a first and second reactor zones. The names of the sections of the reactor were provided with great thought. It cannot be said that the components found in claim 1 lack structural and functional interrelation.

As to the language, i.e., "reduced diameter along coaxial direction from bottom to top of the riser reactor", each section of the reactor has an axis and those axes are "coaxial", that is to say, that they share a common axis. The outlet zone, as claimed, includes a diameter that was reduced in relation to (or was smaller than) the just-adjacent "second reaction zone diameter" when viewing along that common axis from the bottom to the top of the riser reactor. Again, it is a mere matter of style, it is not a matter of vagueness.

Similarly, with respect to claim 5, the Office Action suggests that "it is unclear as to where...is disclosed in the specification." Such is not a matter of vagueness. If there is an appropriate rejection here at all, it is suggested that the rejection would be one for lack of correspondence between the material formerly found in claim 5 and that found in the specification. It is applicants' right to place such information into the specification when such material is presented in an originally filed claim. The remainder of the rejections under 35 U.S.C. 112, paragraph two, are similar. However, since the claims have been extensively rewritten, the rejections would be at worst moot.

In any case, the claims as amended are quite clear and withdrawal of the rejection under 35 U.S.C. 112, paragraph two, of the claims is requested.

Rejection under 35 U.S.C. § 102(b)

Claims 1 and 4-8 stand rejected under 35 U.S.C. §102(b), as being anticipated by Dean et al (U.S. 4,336,160). In support of the rejection the Examiner states:

“With respect to claim 1, Dean et al. disclose a riser reactor comprising a prelift zone **44**, a first reaction zone **46**, a second reaction zone with enlarged diameter **48**, an outlet zone **50** with reduced diameter along a coaxial direction from bottom to top of the riser reactor, and the end of the outlet zone **50** connects to a horizontal tube **52** (FIG 1: column 13, lines 32-65).

“With respect to claim 4, Dean et al. disclose by illustration (FIG. 1) a diameter ratio of said first reaction zone **46** to said prelift one **44** of about 1:1 to about 2:1 and a height of said first reaction zone **46** of generally from about 10% to about 30% of the height of the riser.

“With respect to claim 5, Dean et al. disclose by illustration (FIG. 1) the diameter ratio of said second reaction zone **48** to said first reaction zone **46** is generally from about 1.5 to about 5:1, and the height of said second reaction zone **48** is generally from about 30% to about 60% of the height of the riser. Please note that although the claim specifically recites, “the height of said **first** reaction zone is generally from about 30% to about 60%...” the Examiner considers the term “first” a typographical error and thus interprets the claim on the basis that the applicants intended to recite, “the height of said second reaction zone is generally from about 30% to about 60%...” as evidenced by the specification (page 4, lines 9-12).

“With respect to claim 6, Dean et al. disclose by illustration (FIG. 1) the diameter ratio of said outlet zone **50** to said first reaction zone **46** is generally from about .08:1 to about 1.5:1, and the height of said outlet zone **50** is generally from about 0% to about 20%...” the Examiner considers the term “first reaction” a typographical error and thus interprets the claim in the basis that the applicants intended to recite, “the height of said outlet zone is generally from about 0% to about 20%...” as evidenced by the specification (page 4, lines 16-20).

“With respect to claim 8, Dean et al. disclose by illustration (FIG. 1) a conjunct section between said second reaction zone **48** and said outlet zone **50**, wherein the conjunct section is a circular truncated cone whose vertical section isosceles trapezoid forms a base angle β generally about 45 degrees to 85 degrees. Please note that although the claim specifically recites, “the conjunct section between said first reaction zone and said outlet zone...” the Examiner considers the term “first” a typographical error and thus interprets the claim on the basis that the applicants intended to recite, “the conjunct section between said second reaction zone and said outlet zone...” as evidenced by the Figure (conduit **8** comprising angle β).

“Instant claims 1 and 4-8 structurally read on the apparatus of Dean et al.”

Applicants disagree. First of all, the claims require a riser reactor "configured for a fluidized catalytic conversion process including hydrocarbon cracking reactions on hydrocarbons flowing substantially from a reactor bottom...to produce converted hydrocarbons...". The structure of the claim language is such that the chemical reaction taking place within the confines of the reactor must be taken into account as it influences the structure of the "reactor riser". The limitation is not, a mere statement of intended use. The chemical reaction and the resulting products define structural parameters of the physical reactor that must be taken into account when considering the applicability of prior art to the functionally reactor recited structure. Without appropriate comparison between claim and prior art document of both the physical reactor shape and the included reaction, the prior art document cannot be said to be an appropriate basis for an anticipation rejection or one under 35 U.S.C. 103.

In this instance, the Office Action discusses a specific portion of the chemical reactor system found in Dean et al. that does not, in any way crack a hydrocarbon to produce a "converted hydrocarbon product". Instead, the sections of the device specified in the Office Action, as explained at columns 13, line 1 to column 14, line 14 speak only of use of the device to regenerate a catalyst carrying an amount of by product carbon.

Since Dean et al. does not disclose within the four corners of that document that the regeneration portion of the reactor system disclosed there is able to conduct a fluidized catalytic cracking process and since there is no disclosure as to how to modify such a reactor system to achieve such an ability, the Dean et al. reference is inappropriate both under 35 U.S.C. 102 and under 35 U.S.C. 103.

Indeed, it appears that it is unlikely that the reactor system shown in Dean et al. is so flexible. The reaction temperatures shown in that portion of the Dean et al. patent are quite high, e.g., in the range of 1400°F - 1800°F. The reaction temperatures found in the comparative portion of the applicants specification at page 8 (from about 400°C to about 700°C--752°F to 1382°F). It is, of course, recognized that the claims are to physical reactors--devices--and do not

have temperature limitations recited therein. Nevertheless, by what technique would the Examiner suggest in determining whether the reactor flowing a hot dilute phase catalyst containing gas can be "configured" to achieve a catalytic fluid cracking reaction with a much denser phase catalyst and hydrocarbon. There is no such teaching in the Dean et al. patent. It is not an appropriate rejection under 35 U.S.C. 102 of the claims here - presented.

In summary, although there is some facial resemblance between the reactor system found in the claims and the regeneration system found in the Dean et al. patent, the similarity stops with that minimal similarity. There is no additional teaching sufficient to indicate that the remaining physical parameters of the Dean et al. reactor system may be modified in such a way that they meet the terms of the claims under consideration.

Withdrawal of the rejection is requested.

Rejection of claim 2 under 35 U.S.C. §103(a)

Claim 2 stands rejected under 35 U.S.C. 103(a) as unpatentable over Dean et al (U.S. 4,336,160) in view of Fahrig et al (U.S. 4,295,961). In support of the rejection the Examiner states:

"Although Dean et al. (FIG I) are silent as to whether the total height of said prelift zone **44**, said first reaction zone **46**, said second reaction zone **48** and said outlet zone **50** may measure generally from 10 meters to about 60 meters, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate dimension (such as height of 10 meters to about 60 meters) for the total height in the apparatus of Dean et al., on the basis of suitability for the intended use and absent showing unexpected results thereof, since riser reactors of such dimension are conventionally known in the art, as evidenced by Fahrig et al. In particular, Fahrig et al. teach for a given industrial feed rate, a typical dimension for a riser reactor is 25 meters in height (column 4, lined 63-66). In any event, it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F. 2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233."

Applicants disagree.

Although the deficiencies of Dean et al. as a reference in the design of a catalytic cracking reactor system have been discussed above, the disclosure in Fahrig et al. does not improve its utility as a reference even under 35 U.S.C. 103.

The combination of Dean et al. and Fahrig et al. does not provide a combined disclosure in which the claimed reactor system, is found.

The manner in which the Examiner suggests combining the references is similarly inappropriate. The portion of the Dean et al. disclosure selected for discussion in the Office Action dealt with a regeneration portion of a fluid catalytic unit. The reactor chosen and discussed in the Fahrig et al. reference is instead a riser reactor. Under what set of criteria would the size of a regeneration reactor, basically a fast flowing furnace for burning carbon, be applicable to those in the riser reactor of Fahrig et al.? The reactions specified in the two references for the two reactors are quite different, the sizes of the two reactors are hence completely unrelated.

The suggestion that adjustment of reactor size is within the ordinary skill of the art might, in some circumstances, be true. However, here the results found in the application via use of the reactor system are not predictable and consequently, the old saw about "sizes" is not the right answer here. It is noted that the Office Action cites the CCPA case *In re Rose*, 220 F.2d 459 (CCPA 1955) for the proposition that a change in size involves only ordinary skill in the art. It is surprising that the *Rose* case has been cited here in that it dealt with a pile of lumber, and the claims in this application deal with a reactor system functionally matched to a catalytic process. Citation of a judicial opinion in which catalysis is noted to be "inherently unpredictable" and then dealing with that unpredictability in the Office Action would be the proper course for a rejection as such as here proposed.

The rejection should be withdrawn.

Rejection of claim 3 under 35 U.S.C. §103(a)

Claim 3 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Dean et al. (U.S. 4,336,160) in view of Applicant's Disclosed Prior Art. In support of the objection the Examiner states:

“Dean et al. disclose by illustration (FIG. I) a prelift zone 44 having a height of about 5% to about 10% of the height of the riser. However, Dean et al. are expressly silent as to the specific prelift zone height. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate height for the prelift zone in the apparatus of Dean et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, since it has been held that changed in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. In addition, Dean et al. are silent as to whether the diameter of the prelift zone may be from 0.02 meter to about 5 meters. However, as Applicant's Disclosed Prior Art teaches, “the diameter of the prelift zone is the same as that of a conventional isodiameter riser reactor and is generally from about 0.02 meter to about 5 meter.” (page 3, lines 22-23). Therefore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate diameter (such as a diameter from 0.02 meter to about 5 meters) for the prelift zone in the apparatus of Dean et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, since such prelift zone diameter is conventionally known in the art, as taught by Applicants' Disclosed Prior Art.”

Applicants disagree. The Office Action discusses no “teaching to combine” the Dean et al. reference with Applicants Disclosed Prior Art. As it has been noted above and several places, the Dean et al. reactor system is a regenerator reactor. The reactor discussed in “Applicants Disclosed Prior Art” on its face discusses a riser reactor. There is no indication apparent in the Office Action why one would be led to combine these two teachings for any particular reason.

Withdrawal of the rejection is requested.

Rejection of claims 4-8 under 35 U.S.C. §103(a)

Claims 4-8 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Dean et al. (U.S. 4,336,160). In support of the rejections the Examiner states:

“With respect to claim 4, Dean et al. disclosure by illustration (FIG. I) a diameter ratio of said first reaction zone **46** to said prelift zone **44** of about 1:1 to about 2:1 (i.e. a diameter ratio of 1:1). Dean et al. further disclose by illustration a height of said first reaction zone **46** of generally from about 10% to about 30% of the height of the riser reactor (i.e. about 30% the height of the riser reactor). Although Dean et al. do not expressly disclose the recited diameter ratios or height percentages, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate diameter ratio and first reaction zone height in the apparatus of Dean et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, since it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA) 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

“With respect to claim 5, Dean et al. disclose by illustration (FIG. I) a diameter ratio of said second reaction zone **48** to said first reaction zone **46** of generally about 1.5 to about 5:1 (i.e. zone **48** having an enlarged diameter in comparison to the diameter of zone **46**), and a height of said second reaction zone **48** generally about 30% to about 60% of the height of the riser (i.e. about 40-50%). Although Dean et al do not expressly disclose the recited diameter ratios of height percentages, it would have been an obvious choice for one of ordinary skill in the art at the time the invention was made to select an appropriate diameter ratio and second reaction zone height in the apparatus of Dean Et al., on the basis of suitability for the intended use and absent showing any unexpected result thereof, since it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459,463 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. Please note that although the claim specifically recites, “the height of said first reaction zone is generally from about 30% to about 60%...” the Examiner considers that term “first” a typographical error and thus interprets the claim on the basis that the applicants intended to recite, “the height of second reaction zone is generally from about 30% to about 60%...” as is evidenced by the specification (page 4, lines 9-12).

“With respect to claim 6, Dean et al. disclose by illustration (FIG. I) a diameter ratio of said outlet zone **50** to said first reaction zone **46** of generally about 0.8:1 to about 1.5:1, and a height of said outlet zone **50** generally about 0% to about 20% of the height of the riser.

“Although Dean et al. do not expressly disclose the recited diameter ratios or height percentages, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate diameter ratio and outlet zone height in the apparatus of Dean et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, since it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. Please note that although the claim specifically recites, “the height of said first reaction zone is generally from about 0% to about 20%...” the Examiner considers the terms “first reaction” a typographical error and thus interprets the claim on the basis that the applicants intended to recite, “the height of said outlet zone is generally from about 0% to about 20%...” as evidenced by the specification (page 4, lines 16-20).

“With respect to claim 7, Dean et al. (FIG. I) further discloses a conjunct section between the first reaction zone 46 and said second reaction zone 48, wherein the conjunct section is a circular truncated cone whose vertical section is a trapezoid forming an undisclosed vertex angle α (α). Referring to the illustration, it appears that angle α lies generally between about 30 degrees to 80 degrees; however, Dean et al. are silent as to the specific angle measurement. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate angle measurement for angle α in the apparatus of Dean et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, since it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955); changes in shape involve only ordinary skill in the art. *In re Daily* 149 USPQ 47, 50 (CCPA 1966); *Glue Co. v Upton* 97 US 3, 24 (USSC 1878); and where the general conditions of a claim specifically recites, “the conjunct section between said first reaction zone and said outlet zone...” the Examiner considers the term “first” a typographical error and thus interprets the claim on the basis that the applicants intended to recite, “the conjunct section between said second reaction zone and said outlet zone...” as evidenced by the Figure (conduit 8 comprising angle β)”.

Applicants disagree.

The unsuitability of the Dean et al. patent as a reference that either anticipates or renders obvious the claims has been discussed at length above. The Examiner's suggestions that Dean et al. implies the limitations found in claims 4-8, first of all, is an admission that the rejection under 35 U.S.C. 102 of those claims is not appropriate. Secondly, the allegations that the various

functional recitations found in the claims are easily determined is simply without merit in that there is no teaching in the Dean et al. reference to modify the regeneration system of Dean et al. to change it from a reactor having a specific purpose to another reactor system of surely different materials, dimensions, fluid and solid handling capabilities, etc. Without some kind of an argument (in a chemical engineering sense) on how to so change the reactor setup, the discussion found in the Office Action is incomplete. Addition of the *Rose* case adds nothing, particularly when dealing with a catalytic reaction as the functional basis of claims 4-8. It should be noted, additionally, that the regeneration portion of the Dean et al. device is not one in which a catalytic reaction apparently takes place. Instead, the reaction taking place there is simply one of combustion--that is, the oxidation of carbon to carbon dioxide.

The withdrawal of this rejection is appropriate.

AMENDMENTS TO THE SPECIFICATION

Applicants have accepted the thoughtful suggestions of the Examiner relating to typographical errors found in the specification. No new matter has been added by the amendments proposed above.

CONCLUSION

Applicants have addressed each issue of substance raised in the Office Action. Applicants respectfully suggest that the claims are in condition for allowance. If a telephone conversation would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the unlikely event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, Applicant(s) petition(s) for any required relief including extensions of time and authorizes the Assistant Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. 456962000200.

Respectfully submitted,

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